2011-03-31 Thursday Morning Notes

Thursday, March 31, 2011
5:00 AM

On-call

- Wednesday: DVM
- Thursday : Vladimir
- Friday: Keith
- Saturday: Steve
- Sunday: Jim
- Monday/Tuesday: Keith

Stacking and Transfers

- We stacked 22.7mA/hr with a production of 21.5 pbar/Mp with 7.78 Tp on target.
    - Stack rate down due to large stack sizes
    - If we only look at the stacking iterations overnight from normal stack sizes, we stacked 26.2mA/hr with a production of 22.6 pbars/Mp with 7.79 Tp on target.
- We unstacked 516E10 in 45 transfers over 12 sets with an overall efficiency of 92.6%.
    - Take out the transfer from 141mA, the transfer from 78mA, the two from more than 50mA, and the four transfers over 31mA, then we are only left with three sets of transfers with an overall efficiency of 95.7%.

Interesting Happenings

- D:IKIK PFN was cable was arcing. It looked to be kinked a bit as it entered the snout of the junction can. Re-terminated cable. Cables have been positioned and secured to reduce the strain on the connections.
- Beam dump chilled water controls behaved overnight
- Target yield has a couple of bumps that could indicate a cracked cover. Rotation, motion controls, and air flow are all fine. With the larger spot size, sputtering is likely not an issue.

Dump Water

The change to the CW regulation system is now fully implemented. The purpose of the change is to minimize the range of beam dump thermal cycles as beam comes and goes. From experience over the past couple of months, we think this might help prevent opening up water system leaks. The input parameter to control the new regulation system is beam dump supply cooling water (D:DPTC8).

There are two main modes of operation and probably a lot of minor modes which will eventually come to light. The main modes are:
1. Beam is on and the chill water isolation valve is open. D:DPTC8 runs at about 36.3 degrees.
2. Beam is off and the dump supply water temperature is cycling between about 31 C and 35 C.

If D:DPTC8 falls into the low 20 C range, something is not working as intended. There are a fair number of reasons why things might not be working. The main ones are:
1. Nitrogen gas cylinder has run low which would prevent the CW valve from closing. D:BSA700 is a pressure transducer that will go into alarm if gas pressure falls below 81 psig. I also get a snarky email message. The nominal

pressure is 86 psig. A standby bottle and regulator are ready to be swapped into service if this occurs. Just close one bottle valve, open the other bottle valve, and turn the appropriate two green handled ball valves 90 degrees.
2. The CWmonitor.acl script which now runs from the pbar sequencer has died from various possible causes which I have tried to anticipate, but have probably failed miserably at.
3. The script was killed intentionally by someone setting D:DPCWKL to a number greater than 0.
4. An MADC crate, CAMAC crate, a front end, a network storm or some combination of these have failed or are not playing nicely together.

There is a TIMEAV device D:DPCWRN which keeps an eye open for the main program loop counter activity. The nominal returned value should be 2 min(utes) ± 1 minute. If the main loop stops working, an operator acknowledgeable alarm (Stan - please make the appropriate alarm level change) will come in 200 seconds after the loop failure occurs.

The isolation valve is controlled by D:DPMV3. The logic is inverted for this one, so one can become confused. (I know this from experience.) The device is set to ON to stop CW flow and is set to OFF to allow CW flow. If D:BSA700 is in alarm, the valve might just remain open which IS FAILSAFE. The control status bit of 4 or greater means the valve should be energized and that means . . . ? Right, the valve is shut and CW will NOT flow to cool the dump core. The status bit will be less than 4 if the valve is open.

There are a couple of ways to believe that the acl script is working correctly:
1. D:DPCWCN, the program flag is set to 1.
2. D:DPCWCT, the program script loop counter is incrementing at 1 per minute.

All parameters can be found on P12, dump subpage 1 (water system parameters) and subpage 3 (program control parameters.)

One of the failure modes to be concerned with is that for some reason we have beam on target and the chill water isolation valve is shut for a prolonged period of time. This is a bad thing. Keep in mind that the valve can be shut for up to 2 minutes or so when beam is first turned on which would be necessary to raise the temperature of the thermal mass of the beam dump skid. Within a minute of two though the valve should open. In the event the valve stays shut, some water system temperature alarms will come in and some interlocked beam dump water system parameters will inhibit beam via the C200 module. If this occurs, I suggest contacting a system expert before resetting interlocks and continuing stacking. I have not seen this occur yet, but the system is computer controlled, and anything can happen, right?

You may have heard that we have a remote makeup system now. It is true, but it is not ready for remote operation yet. The water system appears to be holding level at this time, so I am hopeful we won't be in a hurry to get it up and running very soon.

Just in case you are curious, the tank water level can be seen at: [

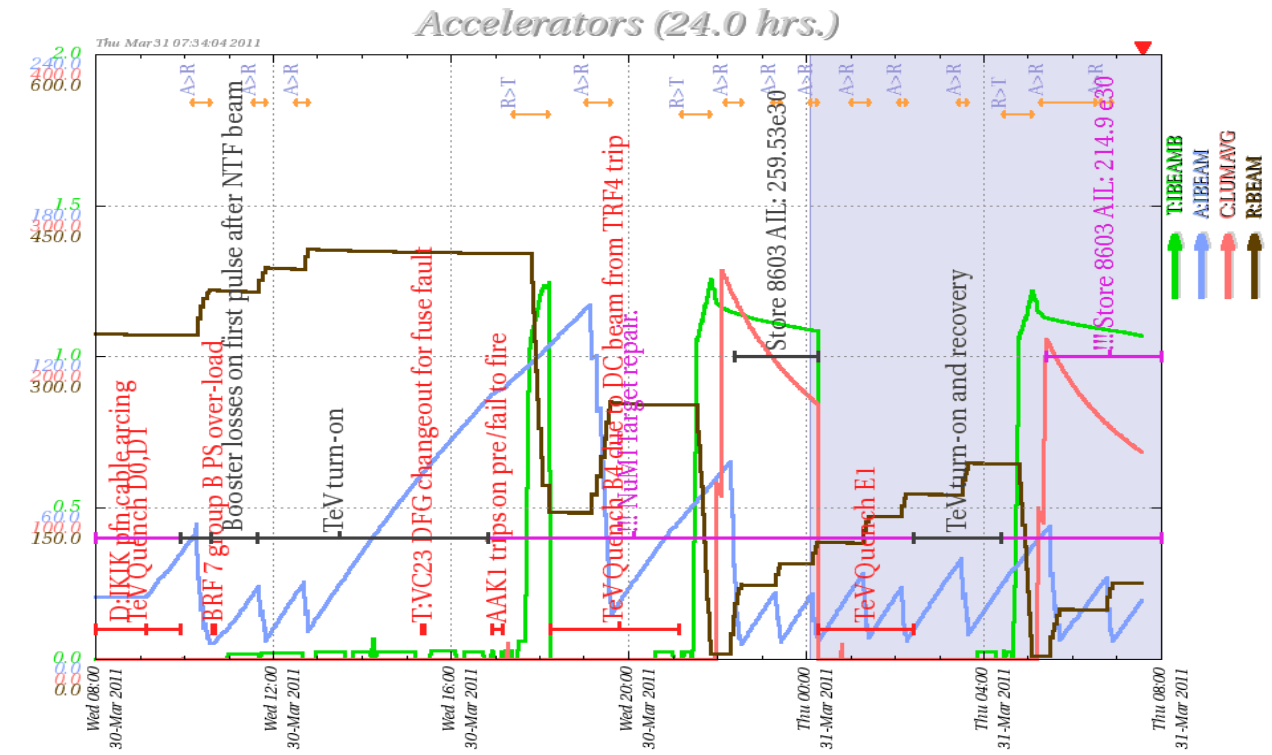
ap0sightglass-2.fnal.gov]. Unless you are at an MCR console, you will need admin permission to download a plugin to make this work. There is also a camera at [131.225.138.84] but it needs to be power cycled pretty regularly. It does give a better view however of the tank level.

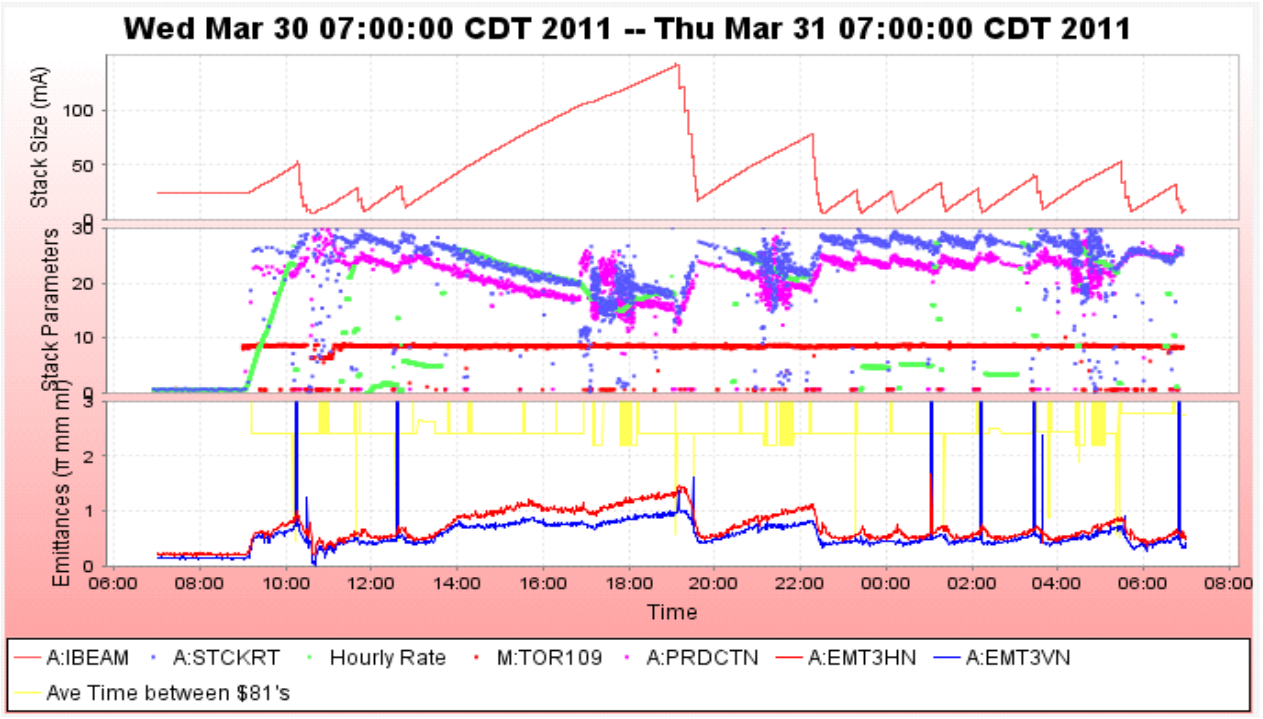
Special thanks to Dave Peterson, Mark Dilday, Stan Johnson, Dave Vander Meulen, Brian Drendel, Ron LeBeau, Jim Zahurones, Ralph Ford, Chris Kelly, Rude Perez, Greg Brown, Steve Conlon, and Dan Stenman for making this system possible.

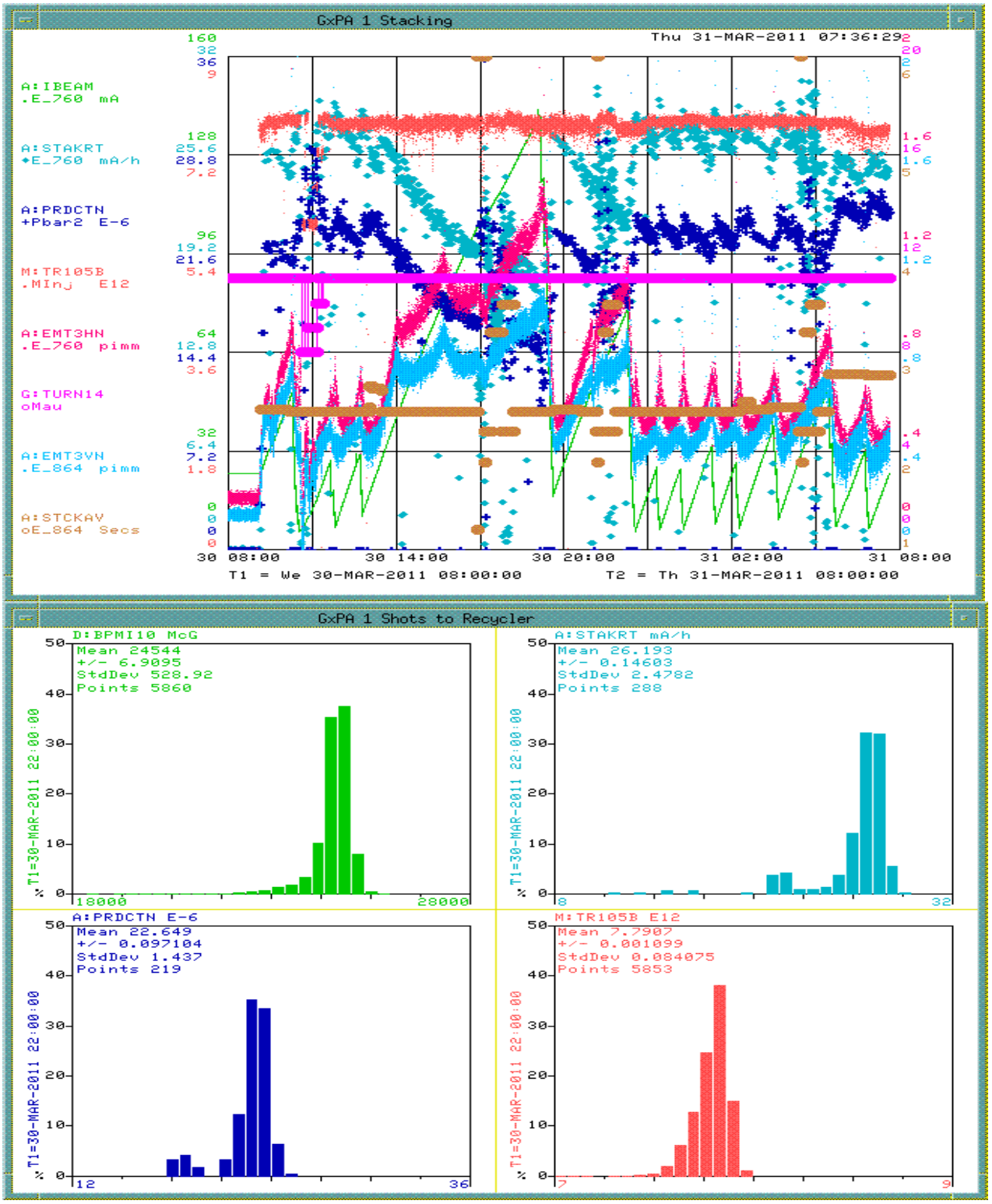
Numbers

- Stacking
  - Pbars stacked: 521.96 E10
  - Time stacking: 22.38 Hr
  - Average stacking rate: 23.32 E10/Hr
- Uptime
  - Number of pulses while in stacking mode: 32230
  - Number of pulses with beam: 31218
  - Fraction of up pulses was: 96.86%
- The uptime's effect on the stacking numbers
  - Corrected time stacking: 21.68 Hr
  - Possible average stacking rate: 24.08 E10/Hr
  - Could have stacked: 538.88 E10/Hr
- Recycler Transfers
  - Pbars sent to the Recycler: 515.51 E10
  - Number of transfers : 45
  - Number of transfer sets: 12
  - Average Number of transfer per set: 3.75
  - Time taken to shoot including reverse proton tuneup: 00.16 Hr
  - Transfer efficiency: 91.77%
- Other Info
  - Average POT : 7.74 E12
  - Average production: 21.60 pbars/E6 protons

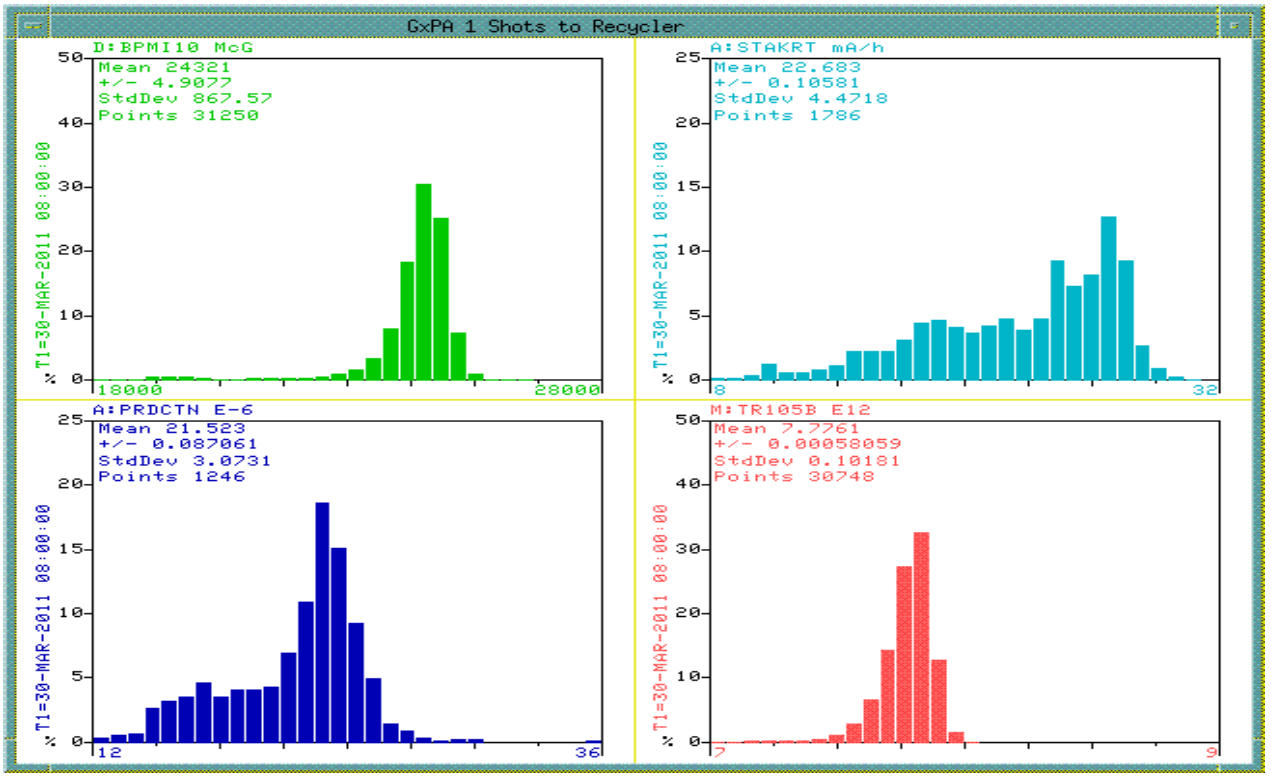
Plots


Accelerators (24.0 hrs.)
Thu Mar 31 07:34:04 2011
T:IBEAMB
A:IBEAM
CLUMAVG
R:BEAM
D:JKIK pln cable arcing
TeV Quench D0,D1
BRF 7 group B PS over-load
Booster losses on first pulse after NTF beam
TeV turn-on
T:VC23 DFG changeout for fuse fault
AAK1 trips on pre/fail to fire
TeV Quench B4 due to DC beam from TRF4 trip
Store 8603 AIL: 259.53e30
TeV Quench E1
TeV turn-on and recovery
Store 8603 AIL: 214.9 e30
Wed 08:00 30-Mar 2011
Wed 12:00 30-Mar 2011
Wed 16:00 30-Mar 2011
Wed 20:00 30-Mar 2011
Thu 00:00 31-Mar 2011
Thu 04:00 31-Mar 2011
Thu 08:00 31-Mar 2011

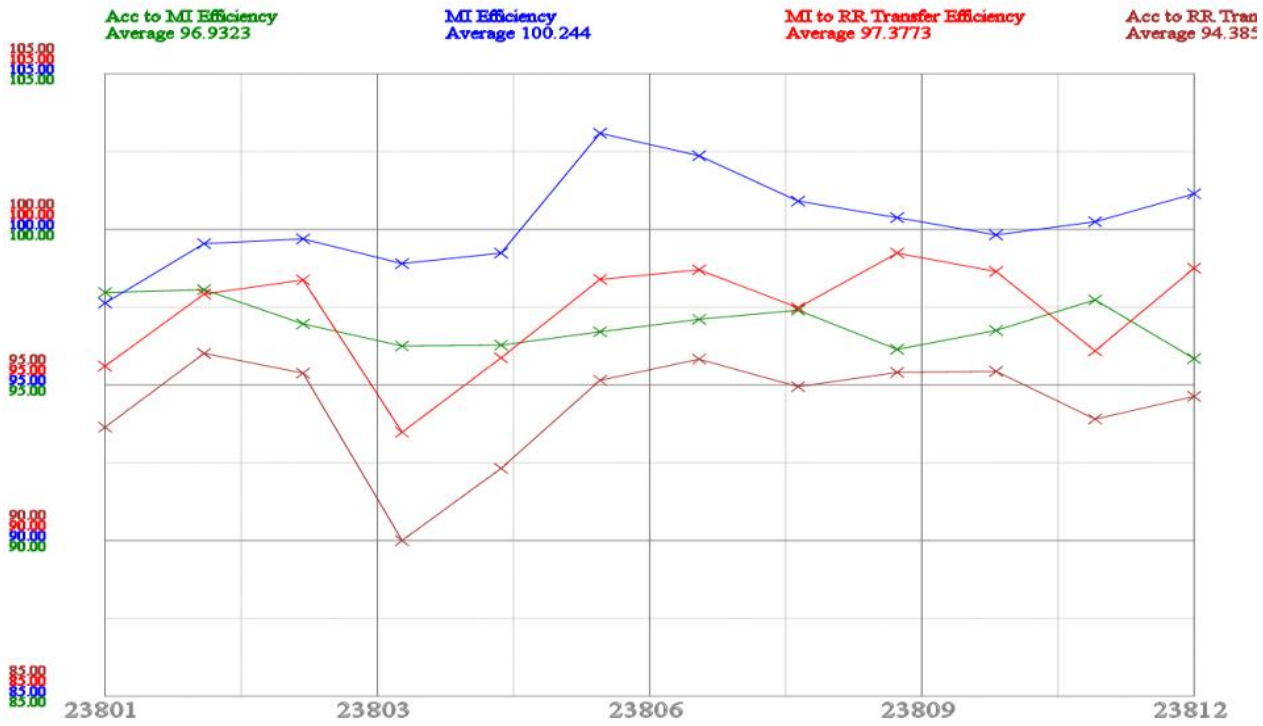

Wed Mar 30 07:00:00 CDT 2011 -- Thu Mar 31 07:00:00 CDT 2011
Stack Size (mA)
Stack Parameters
Emittances (π mm mr)
Time
A:IBEAM
A:STCKRT
Hourly Rate
M:TOR109
A:PRDCTN
A:EMT3HN
A:EMT3VN
Ave Time between $81's



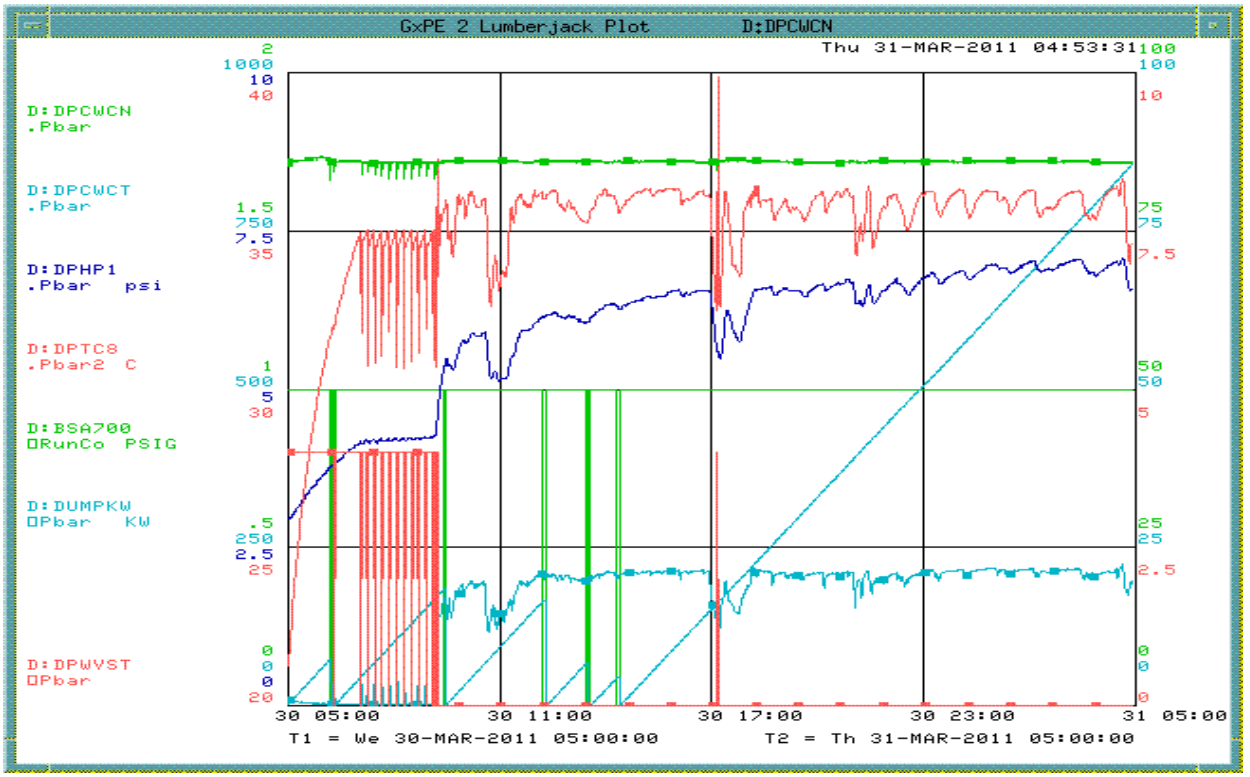
22:00 to 2am….normal sized stacks


GxPA 1 Shots to Recycler
D:BPMI10 McG
Mean 24321
+/- 4.9077
StdDev 867.57
Points 31250
A:STAKRT mA/h
Mean 22.683
+/- 0.10581
StdDev 4.4718
Points 1786
A:PRDCTN E-6
Mean 21.523
+/- 0.087061
StdDev 3.0731
Points 1246
M:TR105B E12
Mean 7.7761
+/- 0.00058059
StdDev 0.10181
Points 30748
T1=30-MAR-2011 08:00:00

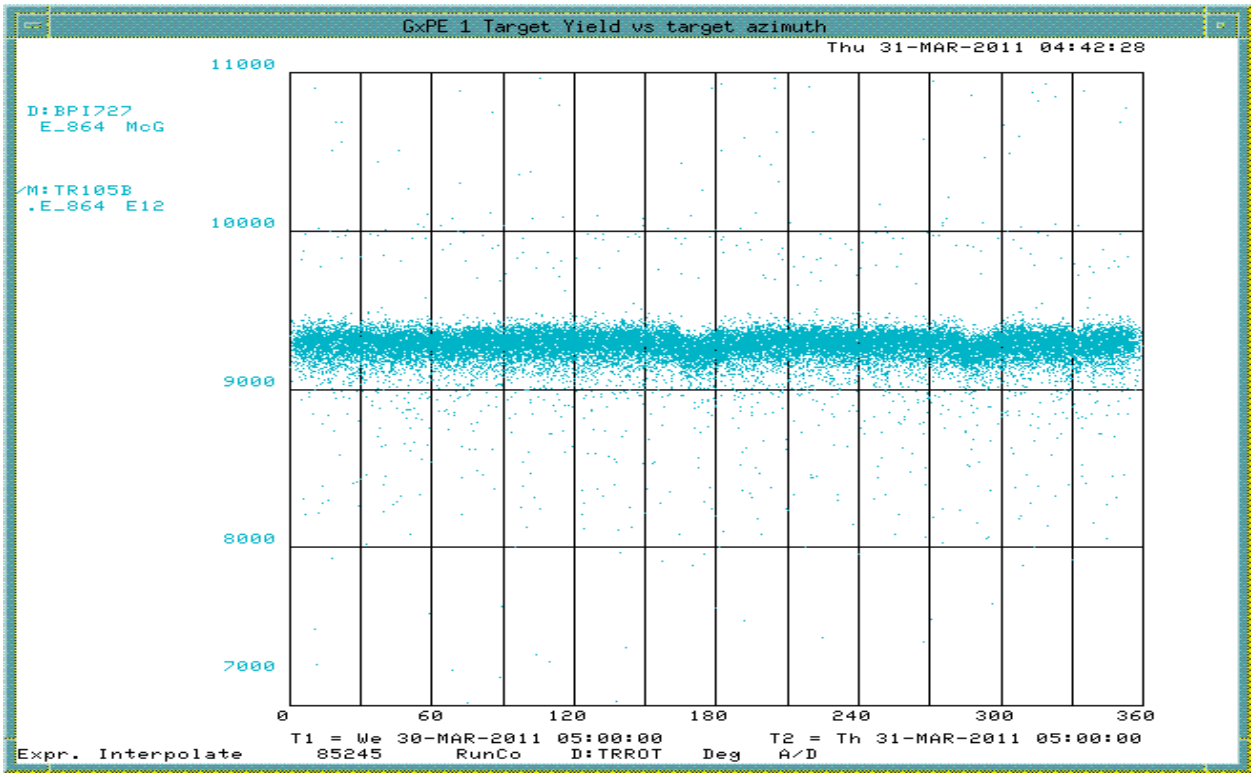
24 hours


Acc to MI Efficiency
Average 96.9323
MI Efficiency
Average 100.244
MI to RR Transfer Efficiency
Average 97.3773
Acc to RR Tran
Average 94.385
105.00
100.00
95.00
90.00
85.00
23801
23803
23806
23809
23812

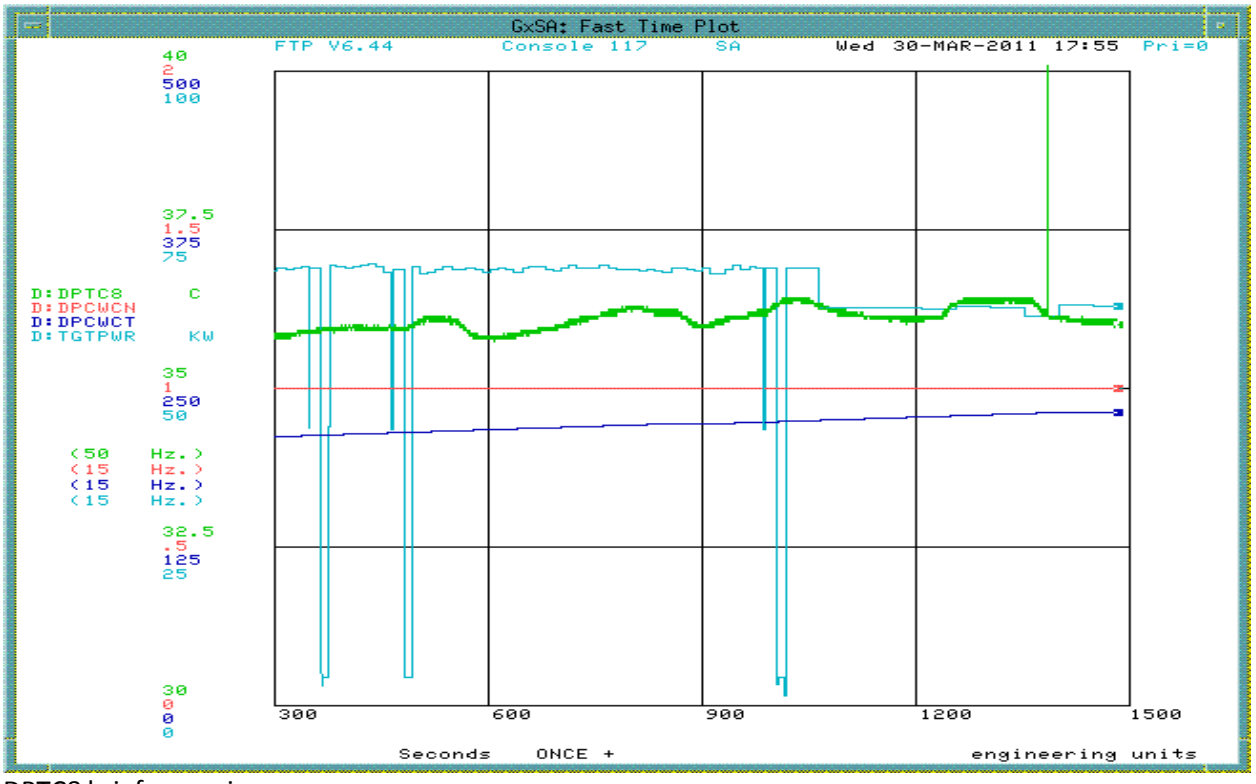
Column 1 Number_0_Pbar Transfer Shot #	Column 4 Number_3_Transfer Time		Column 21 Number_20_A:IBEAMB sampled on $91 (A:BEAM7), E10	Column 22 Number_21_A:IBEAMB sampled on $94 (A:BEAM9), E10	Unstacked (mA)	Column 23 Number_22_R:BEAMS (R:BEAME0[0]) pre xfer E10	Column 24 Number_23_R:BEAM (R:BEAME0[1]) post xfer, E10	Stashed	Acc to RR Eff	Acc to MI Eff	Acc to MI2 Eff	Acc to MI * Acc to MI2 Efficiency	Transfers	Sets	Column 5 Number_4_Acc Horizontal Emittance	Column 6 Number_5_Acc Vertical Emittance	Column 8 Number_7_Acc Longitudinal Emittance
	Totals =>				516.88			478.57	92.59%	96.51%	96.26%	92.90%	45	12	6.3657	4.846	1.8717
	Daily Average =>				516.88			478.57					45	12			
23812	Thursday, March 31, 2011	6:46	32.57	6.72	28.16	49.40	75.63	26.64	94.59%	96.15%	97.19%	93.45%	3	1	5.599	4.34	1.869
23811	Thursday, March 31, 2011	5:29	52.88	7.47	50.27	3.59	49.68	46.93	93.36%	97.15%	97.18%	94.41%	4	1	6.618	5.089	1.857
23810	Thursday, March 31, 2011	3:30	40.10	9.71	33.64	163.42	194.86	32.05	95.26%	96.71%	96.96%	93.77%	3	1	6.074	4.861	1.888
23809	Thursday, March 31, 2011	2:08	28.42	6.84	23.78	141.56	163.97	22.71	95.48%	96.30%	96.97%	93.38%	3	1	5.469	4.211	1.935
23808	Thursday, March 31, 2011	1:17	34.13	8.28	28.41	115.58	141.96	26.87	94.59%	97.42%	97.61%	95.10%	3	1	6.165	4.727	1.919
23807	Thursday, March 31, 2011	0:09	26.32	6.26	22.29	94.78	115.90	21.35	95.80%	97.50%	98.51%	96.04%	3	1	5.415	4.057	1.947
23806	Wednesday, March 30, 2011	23:19	26.79	6.36	22.63	73.68	94.99	21.54	95.20%	96.80%	99.23%	96.06%	3	1	5.338	4.189	1.926
23805	Wednesday, March 30, 2011	22:18	78.68	5.52	77.81	5.70	74.19	70.55	90.68%	95.60%	95.33%	91.13%	6	1	7.205	5.139	1.832
23804	Wednesday, March 30, 2011	19:09	140.86	17.13	131.03	145.41	255.86	116.92	89.23%	95.84%	94.79%	90.84%	7	1	10.489	7.478	1.516
23803	Wednesday, March 30, 2011	12:42	31.04	10.84	21.54	387.11	407.34	20.54	95.37%	96.83%	96.71%	93.65%	2	1	5.955	4.763	1.891
23802	Wednesday, March 30, 2011	11:40	29.23	7.18	25.75	364.65	388.77	24.75	96.12%	98.07%	97.60%	95.72%	3	1	5.553	4.227	1.948
23801	Wednesday, March 30, 2011	10:17	51.02	5.78	51.56	321.54	367.03	47.70	92.52%	97.20%	95.31%	92.64%	5	1	6.508	5.071	1.932



Beam dump chilled water controls behaved overnight.



Cracked cover? Yield shows some structure.



DPTC8 brief excursion

D:IKIK PFN